ONLINE GAMING: THE MEDIATING ROLE OF SITUATIONAL ENGAGEMENT IN FACILITATING PLAYER VALUE

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ABSTRACT

Online gaming continues to grow exponentially, and Pokémon Go has been among the most popular mobile games since its launch in 2016. Media attention on the game has been immense, with particular focus on two of its key aspects: augmented reality and location-based gaming. The incorporation of new technologies into mobile devices to create enhanced gaming environments has transformed traditional gaming behavior and expectations. By applying activity theory, we determined that context facilitation and intrinsic motivation influence players' situational engagement in the creation of player value in online gaming. We gathered 479 valid survey responses from experienced Pokémon Go players for use as empirical data to test this study's hypotheses. The empirical results revealed that 1) context facilitation and intrinsic motivation have direct effects on situational engagement, 2) situational engagement has a direct effect on player value, and 3) situational engagement partially mediates the effects of context facilitation and intrinsic motivation on player value.

Keywords: Pokémon GO; Augmented reality; Context facilitation; Situational engagement; Activity theory

1. Introduction

Online gaming has increasingly become a prevalent form of relaxation. The playing of games involves various contexts and situations, and players benefit from enjoyable and diverse experiences for themselves and for others (Hassan and Hamari, 2020; Rapp, 2020). In 2020, online gaming sales reached an estimated US$173.7 billion, and they are predicted to grow to US$314.4 billion by 2026. The unprecedented COVID-19 pandemic has resulted in

national lockdowns worldwide, forcing people to stay at home in substantial numbers and resulting in increased participation in online gaming (Gaming Market, 2021). The popularity of mobile gaming has increased as technology has evolved, and several key events (e.g. the advent of in-app purchases in 2009) have fueled demand (Wang et al., 2020). Marketing professionals refer to the advent of in-app purchases in 2009 as a pivotal moment in the development of the mobile gaming industry. Mobile games account for 51% of the digital gaming market, which has been forecast to grow 6.1% year on year on 2021 (Purnami and Agus, 2021). The video game company Zynga posted record revenue of US$328 million from mobile games, accounting for 95% of their annual revenue (Palomba, 2020). Niantic Inc.'s location-based augmented reality (AR) mobile game Pokémon Go has passed US$4 billion in total revenue and has over 1 billion downloads (Mihale-Wilson et al., 2021).

The success of online gaming is partially attributable to rapid information and communications technology advancements such as AR and virtual reality (VR) (Zhang and Zhang, 2020). Moreover, companies that conventionally produce games for consoles and personal computers have also released mobile versions of the same games, which has further driven player uptake. The announcements of 5G mobile communication frequency bands and unlimited data have supported the spread of mobile gaming by providing players with substantially increased power and functionality (Gül et al., 2020; Peñaherrera-Pulla et al., 2021). In addition, recent advances in cloud technology have made cloud-based gaming a reality. Servers can store online games and gameplay data and provide the computational power for logic processing, video encoding, game scene rendering, and game video/audio streamlining. Compared with other gaming formats, the overall mobile gaming player experience is far more varied and offers more interaction possibilities; thus, mobile games continue to attract both serious and casual gamers (Bhojan et al., 2020; Zhang and Zhang, 2020).

Computer- and console-based games used to be the defining forms of digital gaming, but mobile games have arguably been established as the predominant contemporary digital gaming format. The detachment of digital play from fixed locations in homes and video game arcades has allowed for an unprecedented spread of gameplay into everyday lives (Kowert et al., 2014; Kowert and Quandt, 2020). Interest in mobile gaming research has increased since the proliferation of the smartphone, allowing players to become immersed in more diverse gaming contexts than had been possible previously. Merikivi et al. (2017) examined the specific role of enjoyment, its key antecedents (i.e., novelty and aesthetics), and user-friendly interfaces as motivations for frequent mobile game use. Balakrishnan and Griffiths (2018) highlighted the role of context in distinguishing excessive gaming from addictive gaming and outlined the importance of context in the life of a gamer. In addition, the capacity for location-based mobile games (e.g., Pokémon Go, Ingress, Turf Wars, Zombies, Run!) has created new platforms for understanding and experiencing our immediate environments (Hjorth and Richardson, 2017). The simultaneous combination of real and virtual worlds through digital devices can create multiple forms of gaming experience. Zsila et al. (2018) indicated that AR gaming offers new avenues for players to satisfy their basic needs and identified critical psychological constructs to help understand the possible motives for gaming in Pokémon Go.

AR layers information from cyberspace onto the physical world and can enhance how players interact with each other. Several researchers have initiated preliminary investigations into location-based AR for pleasure enhancement (Chen et al., 2018; de Souza e Silva, 2017; Laato et al., 2020, 2021). Rauschnabel et al. (2017) explored the critical motivational factors of mobile AR game participation, and their results revealed that hedonic, emotional, and social benefits and social norms drive player reactions. Therefore, a need has arisen to understand how the new cyber–physical world inhabited by Pokémon Go players affects player interactions and enables user engagement, which leads to the creation of player value (Elo et al., 2021). The ability of a player to interact with the real-world environment using a mobile device to capture a virtual avatar has only become possible with the rapid development of diverse technologies. However, this raises questions about how the new cyber–physical environment enables and facilitates gaming experiences. To our knowledge, the relationship between situational engagement and player value with the unique characteristics of the online gaming environment have not been fully investigated. Additionally, the effect of situational engagement on player value has not been thoroughly explored from an empirical perspective. On the basis of these gaps in the relevant literature, we examined (1) the factors that facilitate players' situational engagement and (2) how situational engagement mediates the effects of these factors on player value.

Activity theory offers several valuable insights for identifying a robust theoretical framework to explore the use of a gaming platform that enables new types of experiences for motivated players seeking interesting gaming options. Within the mobile gaming milieu, a motivated player performs gaming activities in a cyber–physical world. Activity theory suggests that an integrated gaming environment can empower players by creating new options for them to direct their playing activities. Thus, a reasonable inference is that the availability of this type of interactive environment should increase player interactions and improve transformation outcomes.

2. Literature Review

2.1. Evolution of Pokémon Go

The development of mobile technology, increasingly powerful devices, and easy access to a diverse range of games have allowed for the growth of the mobile gaming industry (Lucka, 2019). Pokémon Go has been among the most popular mobile games since its launch onto the gaming scene in 2016, with 10 million downloads in its first week and US$800 million in revenue in 2016 alone (Jin, 2017; Paavilainen et al., 2017). Media attention has been immense, and particular focus has been given to two key aspects of the game: 1) augmented reality (AR), a real-time interactive combination of real-world and 3D virtual content; and 2) location-based gaming (LBG), which uses Global Positioning System (GPS) and Global System for Mobile Communications (GSM) networks (Alavesa and Xu, 2020; Grandinetti and Ecenbarger, 2018; Hamari et al., 2019; Koivisto et al., 2019). Niantic, which launched Pokémon Go, has seen continued success, with 2020 being among the most successful years for Pokémon Go in terms of user numbers and profits (Kwak et al., 2021; Laato et al., 2020; Mihale-Wilson et al., 2021).

The new features of the game encouraged people to visit different real-world locations to catch virtual Pokémon. This was a dramatic shift in the sedentary behavior fostered by traditional gaming (Barkley et al., 2020; Laato et al., 2020, 2021). The ability of AR and LBG to engage players in unique formats, such as the creation of cyber–physical environments for enhanced player interactions, has been widely considered in the relevant literature. The first major updates to Pokémon Go were released in 2017 and early 2018 and offered players the much-anticipated opportunity to have increased interactions with each other by creating friend lists, sending gifts, and engaging in optional character trading (Alha et al., 2019). Player-versus-player (PVP) battle functionality was also added, which offered more choice and opportunities to share content with other players. The addition of PVP functionality was a huge success, and it further incentivized players to spend time developing their Pokémon to compete with those of other players, increase their rankings, and exhibit mastery of the core game mechanics (Alha et al., 2019; Arjoranta et al., 2020; Liang et al., 2021; Luna et al., 2020).

Despite the numerous updates to the game since its original launch, COVID-19 has presented major challenges to its further development. Location-based games require players to interact with their physical environments, and the substantial numbers of players who have been confined to their homes have led game developers to instigate a dramatic shift in the game's mechanics (Ellis et al., 2020; Laato et al., 2020, 2021; Macák, 2020). For example, an enhanced sync mechanism allowing for raid battles to be completed without players having to leave home. In addition, the radius of the game map UI has been expanded, and a new battle league has been added to allow for more PVP options, players are now encouraged to work toward a common goal rather than meeting up in substantial numbers at live events. All of these gaming iterations have added to the continued growth of Pokémon Go, as players can still participate in solo and group activities on the enhanced platform. These changes have modified the gaming experience for players and have also allowed for increased freedom in their continued gaming journeys (Laato et al., 2020, 2021).

Mobile device applications are clear examples of the confluence of the communication, media, and entertainment industries. Consideration of AR is useful to this study's focus on Pokémon Go and the technology that enables player interactions (Liao and Chiu, 2021; Pedersen and Nysveen, 2020; Ye et al., 2019). Shea et al. (2017) attributed AR's limited market size to the fact that relatively few phones were mobile AR–enabled at the time of their study. However, they argued that this limited market size would dramatically increase as smartphones became ubiquitous and as the tools to enable mobile AR became more widespread. Furthermore, Lee et al. (2018) argued that AR games can facilitate attainment of the ultimate game experience by immersing players in a cyber–physical environment that overcomes the spatial, temporal, and social boundaries of traditional gaming by ensuring that a player's immediate environment is intrinsic to the game experience.

Another critical feature of the Pokémon Go platform is its facilitation of interactions with the world around the player in both a cyber and real-world context. Mobile devices are mainly used for relatively convenient communication with others. This feature, which already enables strong social connectedness, fits well into both the location-based and multiplayer approaches to gaming (Bailey et al., 2018; Laato et al., 2020; Liang and Turban, 2011; Liang et al., 2011; Turban et al., 2018; Xue et al., 2020). Paavilainen et al. (2017) quantified the importance of location-based gaming in their investigation of Pokémon Go by highlighting that real-world movement in a range of gameplay contexts is considered to be fun, and such movement is a crucial component of the overall game experience.

The consistent updates of Pokémon Go have offered an increasing number of options that players can engage in gaming activities. Boyle et al. (2016) explains that there are several concepts that overlap around the notion of engagement and gaming, particularly flow, immersion and presence. Engagement has been of interest to games researchers looking to understand both the pull of games and why players continue to play games. The Process Model of Engagement offers some insights, namely that engagement is a process comprised of four distinct stages: point of engagement, period of sustained engagement, disengagement, and reengagement (O'Brien and Toms, 2008). Furthermore, the process is characterized by attributes of engagement that connect to the user, the system, and user-

system interaction. Players may initially be drawn to a game due to interest, word of mouth or having a particular goal in mind, leading to more sustained engagement with attributes such as interactivity, feedback and challenge (Cairns, 2016; O'Brien and Cairns, 2016; O'Brien and Toms, 2008). Cairns et al. (2014) describe engagement as the basic level of immersion where players simply invest time and effort to play the game and further consider engagement being protracted beyond the playing of a single session. Players not only progress through games across multiple sessions but also engage in extra-game activities like reading online tips, creating new content and posting videos (Cutting et al., 2019).

A need has arisen to understand how the new cyber–physical world inhabited by Pokémon Go players can affect player interactions and drive continued user engagement, leading to the creation of player value. The ability of a player to walk out into their real-world environment and to then interact with this environment using a mobile device to capture a virtual avatar is only possible because of the rapid development of a wide range of technologies. This raises questions about how this cyber–physical environment enables and facilitates the gaming experience and whether such environments drive continued player interest.

2.2. Application of Activity Theory

Activity theory (AT) offers valuable insights for identifying a clear theoretical framework to address how aspects of a gaming platform are combined such that they enable new types of gaming experiences among motivated players looking for interesting gaming options. Applications of activity theory to address object-related achievements have been widespread (Hsiao and Chen, 2015), but few studies have applied activity theory in IS research (Allen et al., 2013; Nardi 1996) and yet, activity theory offers an interesting opportunity for an improved understanding of IT and its effects on behavior. The current generation of activity theory consists of an expanded framework of interacting constructs (Engeström, 1999), from our research context, the core set of relationships based on subject – object interactions and tool mediation (Vygotsky, 1978) are more applicable when looking to better understand individual player actions and how player motivation can be transformed into outcomes.

According to activity theory, the basic analytical unit of all human endeavor is activity: a purposeful interaction between a subject and an object, in which mutual transformations are accomplished. This interaction is typically mediated by physical tools (e.g., knives, hammers, and computers) or mental tools (e.g., notations and maps) that shape how humans interact with the world (Kaptelinin, 1996). From this perspective, an activity is highlighted as a basic unit of analysis to understand the minimal meaningful context of individual actions (Kuutti, 1995, 1999). According to activity theory, an activity occurs simultaneously at three levels in a hierarchical structure. At the highest level, the activity is directed at a motivation; in other words, the motivation is the object that the subject ultimately wants or needs to attain. Typically, the activity is realized by a sequence of actions, each of which may not be directly related to the motivation (Kaptelinin and Nardi, 2012). Each action is also directed at an object: the goal. As a framework for understanding human interaction through tool mediation, the focus that activity theory places on the subject can be useful because activity theory can be used to not only consider the challenges that this dynamic can create but also explore how the transformation process can lead to the desired outcomes. This transformation of motivation into goals is especially relevant to developers who must ensure that their games are both influential in players' lives and potential avenues of enjoyment.

The ability of a mobile device to transport a user into a cyber–physical world that offers a range of activities can transform a player's understanding of what is possible from gameplay. On the basis of observed phenomena, we were intrigued by the outcome transformation offered through the interactions between a player and the object of the activity. In our research context, an object's mediating role in the relationship between subject and outcome and that between tools and outcome differ from the more traditional application of AT, which has emphasized the mediating role of tools on the interaction between the subject and object.

2.2.1. Intrinsic Motivation in Online Gaming

Several key relationships in activity theory allow for a granular understanding of the connections between a subject and a desired outcome. Allen et al. (2013) introduced the concept of motivation into activity theory and explained it as a factor that influences individuals' goals and drives their activity. An activity is undertaken by a subject who is motivated by a purpose or has an underlying motivation to act on an object to achieve an outcome. We identified intrinsic motivation as representing the relationship between motivation and subject, whereby object formation within an activity starts with a state of need on the part of the subject. The subject's orientation toward one of these actionable objects is influenced by the subject's personal experiences. A motivation for change can emerge from the connections between the needs of an activity's subject and the activity's object.

Within our research context, the motivation for a player's participation in an activity is based on the motivation–subject relationship. Various constructs have been presented to explain why games are engaging; frequently highlighted precursors for basic motivational needs have included competence, autonomy, relatedness, enjoyment, and satisfaction from engaging in the activity. The drive to satisfy such needs intrinsically motivates people to perform

the activity (Ryan and Deci, 2000). The underlying message has been that the probability of goal attainment is limited without purposeful engagement with an activity. Our study defined intrinsic motivation as the engagement in an activity for its inherent satisfaction rather than for separable outcomes (Deci and Ryan, 1985, 2000; Liang et al., 2006; Ryan and Deci, 2000). A game such as Pokémon Go offers exciting missions that allow players to obtain a sense of achievement from playing a game. Players also have the freedom to customize their in-game avatars, to choose which parts of their real-world environment in which to collect Pokémon or related accessories, and to determine groups with which to play the game. Finally, Pokémon Go creates a sense of player connection by fabricating virtual environments with various interesting collectables, trading systems, and challenges that can only be overcome collaboratively. These intrinsic motivators draw players to the game and allow for their initial motivation to lead to feelings of achievement and joy.

2.2.2. Context Facilitation in Online Gaming

Context-aware IT systems are typically developed to support specific human tasks and purposes. The ability of such systems to reflect user needs is essential, and they should be adaptable to changes in such user needs. However, defining context is inherently problematic because it is emergent, continually renegotiated, and defined in the course of action (Kuutti 1995, 1999). In the design of cyber–physical environments, context promotion is provided by various clues and instructions in the task-related environment, with individuals receiving relevant information from the virtual environment by numerous mechanisms such as texting, images, and sound effects. Activity theory explores context as something that is dynamic. It describes context from the perspective of past actions and pressures that influence current meaning and actions, and this description in turn creates the conditions that affect future available courses of action (Nardi, 1996). By applying activity theory, we determined that context facilitation is based on the reciprocal relationship between a tool and an object.

From an activity theory perspective and its connection to our research context, the relationship between the tool itself and the tool's influence on new gaming platforms is interesting. Virtual affordances that highlight relevant information throughout the cyber–physical environment allow for improved understanding of gameplay. Our study defined context facilitation as the information provided to users by the cyber–physical environment that increases their understanding of all available actions (Wang et al., 2020). In Pokémon Go, context-aware markers, virtual representations of real-world features, vibrations, and game messaging facilitate interesting gameplay. Players can draw on their past experiences of Pokémon games or other mobile games to help them understand this new environment. As such, an activity must always be understood in the context of its specific cultural and historical context (Kaptelinin, 1996). The interaction between a player and the cyber–physical world is constantly being shaped and adjusted as a result of player's goals, which are ever-changing, being matched with relevant game activities.

2.2.3. Situational Engagement in Online Gaming

A critical element of activity theory is that an activity is constantly changing as a result of contradictions, tensions, instability, and the systemic needs of the environment and subject (Engeström, 1999). Examining these contradictions closely allows for a greater understanding of the changes in such an activity. The barriers to entry for Pokémon Go are extremely low because gameplay devices are easily accessible, very little gameplay experience is required to understand the game, the game has no fixed location, and interesting game play experiences are readily available (Dorwood et al., 2017; Laor, 2020). This lack of barrier to entry can be useful for attracting players to start a new game but can also be transformational when the easily acquired tools are imbued with feature-rich content. The opportunity for players to use widely available tools to accomplish their in-game defined goals could be both challenging and rewarding (Alavesa and Xu, 2020).

Applying activity theory to Pokémon Go enables the identification of situational engagement based on the set of relationships identified within activity theory's core framework. A motived player wishes to achieve a goal, and goal achievement is enabled through interactions in the cyber–physical gaming environment. However, the same cyber–physical environment has the additional ability to transform the game by allowing players to create new opportunities and experiences. This environment can both facilitate player interactions and encourage freedom in direction and movement within the cyber–physical space. As in the AR space of Pokémon Go, situational engagement is also an important variable outside of a gaming context, with IS research considering situational engagement in the area of e-commerce. For example, consumer engagement is an important variable found to explain and predict consumer behavior, as described by Calder et al. (2016), the psychological state occurs by virtue of interactive, co-creative consumer experiences with a focal agent under a specific set of context-dependent conditions and exists as a dynamic, iterative process (Brodie et al., 2011). Moreover, situational engagement is explained as a behavioral variable that reflects a consumer's participation in and connection with a specific situation or environment (Groeger et al., 2016), and within a shopping scenario, Chung (2018) indicated that situational engagement encompasses a chain of consumer cognitive, emotional and behavioral engaging actions. These actions are connected to specific shopping context-

dependent situations, as a result of these chains of interactions, consumers are able to enjoy a more personalized shopping experience.

With Pokémon Go offering rich engagement experiences, how players are able to sustain their cyber physical interactions could offer new gaming insights. Zhu and Dragon (2016) investigate the effects of mobile technology integration on student situational interest and physical activity, and Rodríguez-Aflecht et al. (2018) investigate the relationship between situational interest and individual math interest via a digital mathematics game. Liu et al. (2018) identify situational interest and gaming behavior from a flow perspective, highlighting the importance of situational interest in mobile game adoption and motivation. In this study, we defined situational engagement as participation in a series of player actions that are directed toward gaming activities in a cyber–physical environment (Arjoranta et al., 2020; Kari et al., 2020; van Roy et al., 2019). The virtual environment of Pokémon Go enhances the overall gameplay experience because players can interact with the game in a new manner. Depending on whether the player is capturing Pokémon, traveling to locate Pokémon, or sharing their gameplay experience with others, the game offers tools to facilitate these goals. This enhanced type of gameplay leads to the creation of new and meaningful forms of player value.

2.2.4. Player Value in Online Gaming

According to activity theory, the relationship between a subject and an object forms the core of an activity. The object of an activity encompasses the activity's focus and purpose, whereas the subject (i.e., a person or group engaged in the activity) incorporates their various motivations. The outcomes of an activity can be the intended ones but also other unintended ones. As previously stated, the outcomes of activity theory are the result of the transformation processes undertaken by the subject during interactions with the object of an activity; through this dynamic process, the outcome of one activity can lead to the object of a new activity. By applying activity theory to Pokémon Go, we identified player value as representing the outcome. From the perspective of Pokémon Go, outcomes can vary because they are unique to each individual user and can change over time, especially as a player accumulates game experience or as game updates introduce changes in its mechanics.

Yang and Liu (2017) identified various factors in both mobile and traditional gaming to understand the value derived from gameplay, including fun, nostalgia, and achievement. According to Hirschman and Holbrook (1982), a key difference between hedonic value and utilitarian value is that hedonic value results in psychological satisfaction for actors, whereas utilitarian value only emphasizes task completion; in this context, hedonic value is derived from the benefits (i.e., fun and relaxation) that players obtain by playing the game or otherwise interacting with others (Elo et al., 2021; Liang et al., 2006; Rezaei and Ghodsi, 2014; Sharma et al., 2020). Isbister (2016) provided evidence to support earlier findings that for gamers and indicated that the power of memory and nostalgia—returning to or referencing classic games or stories—can be a strong attractor. According to Rauschnabel et al. (2017), a key outcome of AR game play is the nostalgia and enjoyment that is felt by the user during the activity. Vella et al. (2017) revealed that 46% of Pokémon Go players among their sample of players are between 18 and 25 years old, indicating that a substantial portion of players may have played or watched Pokémon-related games or comics previously. Marquet et al. (2017) argued that playing Pokémon Go can reduce players' boredom and improve a player's mood. Achievement has been widely examined in the gaming literature (Crawford et al., 2019; Peaty and Leaver, 2020), but its definition has remained problematic and has lacked consistency in the literature as result of its dual nature as they are based around game design concepts and player focused purpose. Achievements are simultaneously related to at least two coinciding factors in gaming: goal completion and the situation in which the achievement's fulfilment conditions are met by the player in a particular game. Achievements are challenging to capture because they are defined simultaneously by the player and the game. For example, a player might seek to achieve level 50 in Pokémon Go and also establish a goal of traveling 5 km per week (Baranowski and Lyons, 2020; Liao et al., 2020). In our study, achievement was defined as a player's positive feelings from achieving a desired goal.

Fostering player value has become a critical factor in sustaining online game providers' competitive advantage. With reference to the prior literature regarding value creation in AR mobile games (e.g., Bae and Koo, 2016; Gatautis et al., 2021; Yang and Liu, 2017), player value was conceptualized as a synergy that is derived from online gaming contexts to generate three complementary values—hedonic, achievement, and nostalgia value—and synergize these values for Pokémon Go players. The combination of these three critical values reflects the multidimensional nature of player value. Hence, player value is the multidimensional synergy comprising three value aspects, namely hedonic, achievement, and nostalgia value, collectively yielding player value in Pokémon Go. The synergies among these subconstructs result in the formative construct of player value. Since, firstly, a change in one sub-construct in isolation will inflict impacts on player value without necessarily associating with a variation in the other value subconstructs; secondly, the direction of causality is from the three value subconstructs to the player value; thirdly, there is no reason to expect these subconstructs to be highly correlated, and fourthly, dropping one subconstruct from the higher-order player value construct cannot comprehensively represent the connotation of the construct (Chin, 1998; Jarvis et al.,

2003). Player value in this study was thus identified as a second-order formative outcome measure for Pokémon Go players. These three dimensions must be converged to represent a player's perceived benefits, the subconstructs cumulatively contribute to a higher-order player value construct that can parsimoniously explain this synergy. Given the above-mentioned multidimensional nature of player value (Elo et al., 2021; Liang et al., 2021; Lintula et al., 2017; 2018), we conceptualized player value as a second-order formative construct comprising three first order reflective constructs: hedonic, achievement, and nostalgia value subconstructs.

3. Theoretical Development and Research Model

3.1. Effects of Context Facilitation on Situational Engagement

When interacting with objects or people in an environment, an individual's cognition can be affected by objects in the environment, resulting in possible changes in the individual's corresponding behavior and thoughts. The various cues and prompts of the cyber–physical environment enable individuals to understand what type of activities can be completed and how to most easily complete them. According to Linderoth (2012), people make appropriate responses and judgments based on the information and affordance cues that they receive. In a mobile AR game, player abilities are matched with technology that enables player interactions. For example, a player is informed of their direction of travel by the integration of a player avatar and virtual world artifacts displayed on the screen of the player's mobile device.

Goel et al. (2013) revealed that virtual environments provide context facilitation through various task-related cues and instructions, and individuals can receive information or cues from the virtual environment in multiple formats such as text, images, and sound effects. In Pokémon Go, objects such as gymnasiums and supply stations provide cues such as icon changes and vibrations to inform the player to take action: this is context facilitation. From an activity theory perspective, the tools of the cyber–physical environment are related to diverse characteristics such as the game interface (e.g., the configuration of the game screen and the appearance of objects), the basic game mechanics (e.g., exploring, catching, and battling), and rewards that can affect the psychological and behavioral participation of players. These clues facilitate player access to various options from the cyber–physical platform and affect their situational engagement in relation to scenarios, activities, and overall gaming situations (Kari et al., 2020; Yu et al., 2021). As such, context facilitation boosts players' situational engagement. Thus, we proposed the following hypothesis:

H1. *Context facilitation is positively associated with situational engagement.*

3.2. Effects of Intrinsic Motivation on Situational Engagement

Intrinsic motivation is the drive to complete a task which comes from inside an entity (Deci and Ryan, 1985, 2000). This type of motivation is derived from the individual enjoyment or fulfillment felt when working on a task, separate from potential outcomes or consequences. They defined intrinsic motivation as the desire of an actor to perform an activity. To intrinsically motivate players, a game must enable them to discover how to complete a task optimally on their own (Buil et al., 2019; Danka, 2020). Modern people play games because they enjoy exploring the game world and improving their skill levels or because they like the excitement and strong feelings that games provide. We could develop this idea further by suggesting that a player's curiosity about an activity in the gaming environment is an incentive for them to further understand the experience. Broom et al. (2019) explored the motivation for gameplay and its effect on players and concluded that online games can enhance intrinsic motivation and short-term happiness by providing players with the means to fulfil their general psychological needs.

According to activity theory, the occurrence of a behavior must be accompanied by motivation. Leont'ev (1978) argued that motivation is required for people to perform actions and engage in targeted behaviors. Exploring new cyber–physical environments, using mobile AR, and competing with other players lead to higher levels of game participation, perception, and positive emotions. In our research context, players' curiosity and enjoyment of the Pokémon virtual world have most often been discussed in studies on the decision to play Pokémon Go (Ghazali et al., 2019; Marquet et al., 2017; Wang, 2020). Players' curiosity is based on the desire to understand and experience the AR features of Pokémon Go (Rasche et al., 2017). A reasonable deduction is that effective incentives to play a game facilitate a shift in a prospective player's psychological state toward an active propensity to play the game. Intrinsic motivation can evoke players' feelings of a heightened level of personal relevance, interest, and arousal and can exert strong effects on their situational engagement in relation to a scenario, an activity, and the overall gaming situation (Alsawaier, 2018; Buil et al., 2019; Danka, 2020; Mekler et al., 2017; Sun and Hsieh, 2018). Thus, intrinsic motivation leads players to engage in gaming activities that are offered on a cyber–physical platform. Therefore, we proposed the following hypothesis:

H2. *Intrinsic motivation is positively associated with situational engagement.*

3.3. Effects of Situational Engagement on Player Value

According to activity theory, activities are performed and goals are achieved through individual and cooperative actions. Chains of such actions are related to each other because they have the same overall object and motive. These

chains of actions are formed through the transition from interactions with the object of an activity to the creation of its outcomes (Kuutti 1995, 1999). In online gaming, player value (i.e., hedonic, achievement, and nostalgia value) is the eventual outcome of gaming activity comprising these chains of actions, such as catching Pokémon, finding gyms to battle other players, and engaging in raids. Situational engagement reflects a players' interaction with an activity that requires purposeful actions within in a cyber–physical gaming scenario. Furthermore, research has suggested that situational engagement can influence players' responses.

Situational responses can involve the decision to play a game or the value derived from gameplay, such as fun (Elo et al., 2021; Marquet et al., 2017; Rauschnabel et al., 2017; Sharma et al., 2020), nostalgia (Harborth and Pape, 2020; Wang, 2020; Wulf et al., 2018), and achievement (Crawford et al., 2019; Ghazali et al., 2019; Vidergor, 2021). A player might appreciate highly relevant gaming situations and engage in increased gaming activities as he or she becomes increasingly aware of the wide range of available gaming options. The player is thereby provided increased opportunities to engage in activities to enable improved facilitation of their goals (Kaczmarek et al., 2017). Therefore, a gaming activity participant performs purposeful actions, and players are able to enjoy tailored and entertaining play experiences through chains of player actions that are directed toward specific scenarios on the cyber–physical gaming platform (Mosquera et al., 2020; Oleksy and Wnuk, 2017). The gameplay literature has indicated that games typically attract players and affect their happiness because the game experience fulfils their psychological needs. Thus, game players obtain value through interacting with the game interface. Value generated by the player experience is a driving factor of continued play. Zsila et al. (2018) revealed that playing Pokémon Go can create player value by outcomes such as the experience of nostalgia and the avoidance of boredom. In that sense, after a player catches a Pokémon, they gain emotional benefits from playing the game. Therefore, we proposed the following hypothesis:

H3. *Situational engagement is positively associated with player value***.**

3.4. Role of Situational Engagement as a Mediator

As hypothesized previously, context facilitation and intrinsic motivation have positive effects on situational engagement. In turn, situational engagement affects player value. However, how situational engagement mediates the effects of its drivers on game player value remains unclear. Activity theory suggests that subjects are motivated by a purpose to act on an object to achieve a specific outcome. A transformation process results from the interaction with the object, leading to a desired outcome. A key consideration is the facilitation of the tools that the subject uses to enable such a transformative outcome (Allen et al., 2013). A gaming activity is undertaken by a player with an underlying motivation to achieve relevant outcomes (Allen et al., 2013). Context facilitation enhances the object of the activity by IT integration throughout the gaming activity, and the player interacts with the object of the activity on a far more individualized basis than is possible without such IT integration (Chen et al., 2013).

The context facilitation provided by the synergistic platform facilitates additional player comprehension about what to do in the game through the affordances offered by the cyber–physical environment. Players can be assisted and directed toward specific gaming scenarios. For example, Pokémon Go provides players with cues (e.g., game notifications or rewards) on how objects (e.g., Pokéstops, gyms, and stardust) operate, informs players of their current positions, and guides them in terms of which direction they should move. Players thus interact with the cyber–physical environment based on the unique gaming situation that it offers, with each interaction in the player journey representing a potential instance of situational engagement. On the basis of this discussion, if the context facilitation of the synergistic platform provides numerous functionalities that allow players to easily explore a new gaming environment, player engagement and player value can be further enhanced.

Similarly, synergistic platforms provide incentives to players that are highly relevant to their gaming goals and eventual outcomes. For example, the cyber–physical environment provides increased opportunities for players to engage in collaborative activities that suit their goals and offer unique opportunities for players to search for pleasurable gaming experiences. A sense of longing for the past or reminiscing about past experiences is useful for creating relevant player content and essential for incentivizing players to participate in games and connect with a specific situation or environment. For example, players might be reminded of childhood experiences such as watching cartoons and reading comics related to Pokémon when they play the game. This intrinsic motivation encourages players to experience new mobile games that connect them with unique activities or environments; this motivation thus drives individualized player value. Motivated players can enjoy gaming benefits from (1) the substantial enhancement of player value (e.g., fun and relaxation) that is obtained by playing the game or otherwise interacting with others, (2) positive feelings from achieving a desired goal, and (3) feelings of nostalgia. Therefore, intrinsic motivation and context facilitation are likely to facilitate the positive effect of situational engagement on player value. Thus, we proposed the following hypotheses.

H4a. *Situational engagement mediates the relationship between context facilitation and player value.*

H4b. *Situational engagement mediates the relationship between intrinsic motivation and player value.*

Drawing on the perspective of activity theory, we developed a nomological framework and corresponding set of plausible hypotheses to explore the relationships between the four identified critical constructs (i.e., context facilitation, intrinsic motivation, situational engagement, and player value) and to highlight the previously described research gap. As illustrated in Figure 1, the model proposed that context facilitation and intrinsic motivation influence game player value in situational engagement in online gaming. Situational engagement was modelled as a mediator of the effects of context facilitation and intrinsic motivation on Pokémon Go–derived player value.

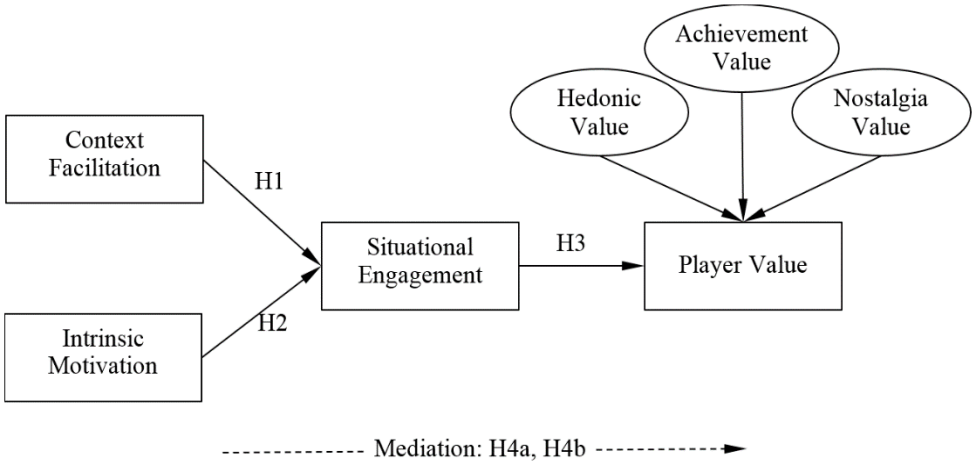

Figure 1: Research Model

4. Methodology

4.1. Measurement Development

This study's first stage was to construct the research model and develop the questionnaire items. We reviewed the prior relevant research to obtain the validated scales used in our study. Because of a deficiency of measurement on the four major constructs of the proposed research model, some scale items and fragments from the relevant literature were included in the initial pool as candidate questionnaire items. In addition, some self-developed questions were adopted from the IS/IT-related literature with tailored modifications to fit the online gaming context. After the collection of candidate measurement items, we conducted an iterative round of personal interviews with subject matter experts and experienced Pokémon Go players to further refine the items. The iterative interview process revealed that the scale items manifested the desired phenomena and confirmed that the critical notions of the conceptual framework's construct domains were not absent.

To match the qualitative criteria for content validity, 12 academic and practical subject matter experts were invited to review the draft questionnaire. The responses of these 12 experts were used to calculate the content validity ratios and to investigate whether the draft questionnaire encompassed all aspects of the construct being measured. After refining the initial scale items, we conducted a pretest (i.e., personal interviews with 10 panelists) to clarify the correctness and comprehensiveness of our survey instrument. The purpose of this pretest was to develop lesser items for each construct while preserving the adequacy of the psychometric properties.

The final questionnaire for the survey study comprised three sections. The first section communicated simple instructions for the questionnaire. The second section recorded the respondents' demographic information including gender, age, occupation, education level, monthly income, experience, and frequency of and average time spent playing Pokémon Go. The final section recorded the participants' perceptions of each scale item regarding the major constructs of our proposed research model. Table 2 provides a final list of the questionnaire items. A 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to measure all the items.

4.2. Survey Administration

We collected empirical data from a large-scale survey website (i.e. SurveyCake) to validate our conceptual framework. Experienced Pokémon Go players were cordially recruited to participate in the survey, and 517 responses were collected. To improve the quality of the collected empirical data, an attention check question was used to examine whether the participants paid attention to the survey questions. After a strict data screening procedure, the responses of 38 participants who did not pass the attention check question or who provided half-finished responses were removed from the final data set. Altogether, 479 valid responses (valid return rate = 92.65%) were retained for subsequent statistical analysis. Table 1 presents the survey participant details.

Table 1: The Profile of the respondents (N=479).

Variable	Classification	Freq.	%
Gender	Male	323	67%
	Femle	156	33%
Age	Less than 19	35	7.31%
	20-24	105	21.92%
	25-29	119	24.84%
	30-34	103	21.50%
	35-39	56	11.69%
	Above 40	61	12.73%
Occupation	Office workers	307	64.09%
	Students	131	27.35%
	Free Industry	27	5.64%
	House Keeping/Retired	11	2.30%
	Unemployed	3	0.63%
Education Level	Junior high school	10	2.09%
	Senior high school	26	5.43%
	College/University	291	60.75%
	Graduate School	152	31.73%
Monthly Income (NTD$)	Less than NTD$20000	122	25.47%
	NTD$20001-40000	171	35.70%
	NTD$40001-60000	121	25.26%
	NTD$60001-80000	31	6.47%
	Above NTD$80001	27	5.64%
	Others	7	1.46%
Frequency of Playing Pokémon Go	Everyday	373	77.87%
	1-2 times/week	48	10.02%
	3-4 times/week	27	5.64%
	5-6 times/week	25	5.22%
	Others	6	1.25%
Average play time per session	Less than 1 hour	166	34.66%
	1-2 hours	201	41.96%
	2-3 hours	67	13.99%
	3-4 hours	18	3.76%
	Above 4 hours	27	5.64%
Equipment for playing Pokémon Go/	Smart Phone	455	94.99%
	Tablet PC	14	2.92%
	Wearable device (e.g., iWatch)	10	2.09%

5. Data Analysis

5.1. Measurement Properties

The validity of the measurement model relating the scale items to their latent constructs was analyzed using SmartPLS 2.0 M3 (Ringle et al., 2005). Through confirmatory factor analysis, the validation of item loadings, reliability, convergent validity, and discriminant validity was performed for the four principal constructs of our research model. As exhibited in Table 2, the loadings for all the constructs with reflective measures were well above the 0.707 guideline and were statistically significant at the 0.001 level, indicating satisfactory item reliability for the reflective measures (Chin, 1998; Chin et al., 2003). The results collectively suggested good measurement properties for all the constructs. The factor loadings and cross-loadings among the scale items are listed in Appendix A.

Table 2: Descriptions and Confirmatory Factor Loadings of Scale Items

Construct	Item#	Scale item	Mean	Loading
Context Facilitation (CF)	CF01	The game environment (such as: the change of Pokéstop and gym icon) provides me with cues.	4.30	0.869
	CF02	The game environment allows me to understand how objects (such as: the change of Pokéstop and gym icon) operate.	4.31	0.908
	CF03	The game environment guides me in which direction I should go.	4.27	0.826
Intrinsic Motivation (IM)	IM01	It is pleasurable to play Pokémon GO.	4.25	0.755
	IM02	It allows me to interact with others.	4.01	0.751
	IM03	Playing Pokémon GO reminds me of my childhood.	3.76	0.762
	IM04	For the feeling of efficacy I experience when I play Pokémon GO.	3.79	0.752
Situational Engagement (SE)	SE01	When playing Pokémon GO, I pay close attention to where I can catch Pokémon.	4.32	0.891
	SE02	When playing Pokémon GO, I care if I can find a gym to battle with other players.	4.34	0.872
	SE03	When playing Pokémon GO, previous experiences draw me to participate.	3.98	0.742
Hedonic Value (HV)	HV01	Collecting Pokémon is interesting.	4.34	0.816
	HV02	The process of playing Pokémon GO gives a sense of adventure.	4.27	0.872
	HV03	The mixing of the cyber/physical worlds is appealing.	4.09	0.824
Achievement Value (AV)	AV01	I think that I can dominate the gym with my Pokémon.	3.99	0.890
	AV02	I think that I have a higher level Pokémon than other players.	4.11	0.907
	AV03	I think that my level is higher than other players.	3.99	0.830
Nostalgia Value (NV)	NV01	Pokémon GO reminds me of watching/reading cartoons/comics related to Pokémon.	3.90	0.855
	NV02	Pokémon GO brings back a sense of reminiscence from when I played the original games.	3.69	0.886
	NV03	Pokémon GO reminds me of my childhood.	3.65	0.865
	NV04	Pokémon GO brings back fun memories.	3.53	0.786

The square root of the average variance extracted (AVE) for each construct was used to assess discriminant validity. Chin [1998] suggested that the square root of each AVE should be greater than the interconstruct correlations. Table 3 illustrates the composite reliability, Cronbach's alpha, AVE, square root of the AVE, and correlations between the constructs. The composite reliability values for all constructs exceeded the recommended minimum level of 0.70, indicating adequate internal consistency. All constructs shared more variance with their respective indicators than they did with the other constructs. The convergent validity and discriminant validity of all constructs of the proposed research model were confirmed.

Table 3: Construct Correlations, Convergent Validity and Reliability.

Construct	Mean	S.D.	1.	2.	3.	4.	5.	6.
1. Context Facilitation (CF)	4.28	0.94	0.868*					
2. Intrinsic Motivation (IM)	3.95	0.99	0.440	0.755				
3. Situational Engagement (SE)	4.08	0.99	0.431	0.598	0.837			
4. Hedonic Value (HV)	4.03	1.00	0.453	0.635	0.562	0.838		
5. Achievement Value (AV)	3.90	1.09	0.366	0.453	0.455	0.417	0.876	
6. Nostalgia Value (NV)	3.69	1.23	0.162	0.320	0.275	0.303	0.245	0.849
Cronbach's Alpha			0.836	0.750	0.783	0.787	0.847	0.870
Composite Reliability			0.902	0.841	0.875	0.876	0.908	0.912

* Diagonal elements are the square roots of the AVE of the construct.

5.2. Structural Model Test

To validate the proposed nomological model's fit, the explained variance (R^2) of the endogenous constructs and a global goodness-of-fit index (GFI) were evaluated. For the exogenous constructs (i.e., intrinsic motivation and

context facilitation), the mean value of the average communality was 0.64. In addition, the average R^2 for the endogenous constructs (i.e., situational engagement and player value) was 0.39. The GFI was calculated by multiplying the square root of the product of the average communality and average R^2 value (Wetzels et al., 2009). The GFI value of 0.50 was higher than the criterion value of 0.36 for large effect sizes of R^2. A substantial amount of the variance in the endogenous constructs was thus explained by the proposed research model. As such, the structural model fit was confirmed by the results of the analysis.

After the adequacy of the structural model was confirmed, bootstrapping of the 479 cases was conducted with 5000 samples to estimate the statistical significance of the parameter estimates. The path coefficients and explained variances of the conceptual model in this study are presented in Figure 4. For H1, the significant path coefficient of 0.21 (t value = 5.05, $p < 0.01$) confirmed the positive effect of context facilitation on situational engagement. This result indicates that players who perceive higher levels of context facilitation are more likely to engage in Pokémon Go gameplay than are players who perceive lower levels of context facilitation. The influence relationship of intrinsic motivation on situational engagement (i.e., hypothesis H2) was confirmed by its significant path coefficients of 0.51 (t value = 13.19, $p < 0.01$). This finding indicated that the construct of intrinsic motivation significantly affected the situational engagement of Pokémon Go players. Consistent with our proposed hypothesis, the partial least squares (PLS) analysis also provided strong support for H3 regarding the relationship of situational engagement with player value among Pokémon Go players. This result indicated that player perception of situational engagement positively affected the creation of player value in the Pokémon Go context. The significant magnitudes of the path coefficients provided strong support for the nomological validity of our proposed conceptual framework. As exhibited in Figure 2, the total effects (i.e., the direct and indirect effects of all the antecedents) in our research model explained 38.1% of the variance in player value. The two major antecedents (i.e., context facilitation and intrinsic motivation) explained 39.2% of the variance in situational engagement. Accordingly, the analysis confirmed that the proposed model provides robust explanatory power for analyzing player value in Pokémon Go.

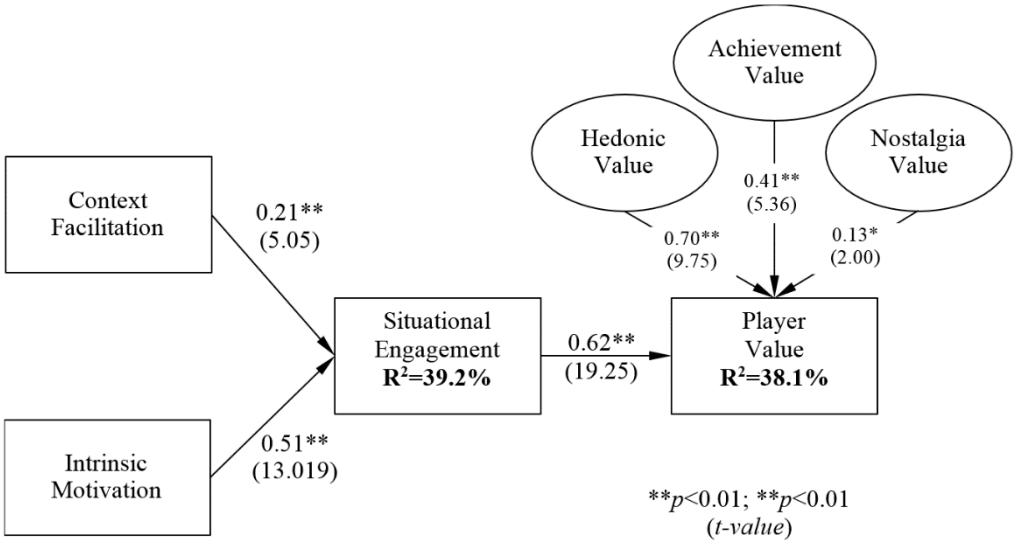

Figure 2: Results of the PLS Analysis

Following Barron and Kenny (1986), we further examined whether the effects of context facilitation and intrinsic motivation on online player value were mediated by situational engagement (H4a and H4b). Through calculation of the means and standard deviations of the bootstrap samples from the PLS analysis, the factor scores of the four major constructs were collected to evaluate the mediating effect of situational engagement. The multiple regression analysis (MRA) results indicated that context facilitation and intrinsic motivation had positive and significant effects on player value ($\beta = 0.11$, t value = 2.69, $p < 0.01$ and $\beta = 0.52$, t value = 12.43, $p < 0.01$, respectively). The mediating factor (i.e., situational engagement) also had a positive effect on player value ($\beta = 0.47$, t value = 11.74, $p < 0.01$). In the presence of the situational engagement mediator, the effects of context facilitation and intrinsic motivation on player value became less significant. The MRAs revealed that context facilitation became insignificant ($\beta = 0.07$, t value = 1.622, $p > 0.1$) and intrinsic motivation had a less significant effect on value creation among Pokémon Go players ($\beta = 0.42$, t value = 8.95, $p < 0.01$). This finding suggested that the construct of situational engagement is a critical

mediator because it has a complete mediating effect on context facilitation and a partial mediating effect on intrinsic motivation towards on player value. Hypotheses H4a and H4b were thus supported by the results of the MRA.

Furthermore, Sobel and Goodman tests were conducted to confirm the mediating effect of situational engagement on the causal relationships of context facilitation and intrinsic motivation on player value in Pokémon Go. The Sobel and Goodman test results also provided strong support for the mediating effects of situational engagement on context facilitation (Sobel's $z = 3.34$, $p < 0.01$; Goodman's $z = 3.37$, $p < 0.01$) and intrinsic motivation (Sobel's $z = 7.23$, $p < 0.01$; Goodman's $z = 7.25$, $p < 0.01$) towards player value in Pokémon Go. These findings all suggested that the influence relationships of context facilitation and intrinsic motivation on player value in Pokémon Go were partially mediated by situational engagement, thereby providing additional support for H4a and H4b.

5.3. Common Method Variance Bias

The self-administered data collected through this study's online survey presented the potential risk of common method variance bias. Following Podsakoff et al. (2003), we organized the questions to counterpoise the order of measurement of the consequent and antecedent latent constructs, which addressed the aforementioned bias problem in the survey design in two aspects. First, the order of the questions related to the four major constructs was randomly arranged in our questionnaire. Second, the questions related to the consequent variables (i.e., situational engagement and player value) followed rather than preceded the questions for the antecedent variables (i.e., intrinsic motivation and context facilitation). In the analysis phase, we applied two statistical analyses to evaluate the potential presence of common method bias. First, a Harmon one-factor test was conducted on the four principal constructs of context facilitation, intrinsic motivation, situational engagement, and player value in our research model. The results of the Harmon one-factor test revealed that all scale items retained in the exploratory factor analysis accounted for 67.07% of the total variance. Additionally, the first major construct explained the greatest proportion of the covariance (i.e., 34.99%) of all the constructs. Thus, we can reasonably conclude that common method variance bias was not a serious concern in this study. Moreover, we followed Podsakoff et al. (2003) and Williams et al. (2003) by including a common method factor in the PLS analysis. As illustrated in Appendix B, the mean value of substantively explained variance from all of the scale items was 0.703, and the mean value of method-explained variance was 0.008. The ratio of substantive variance to method variance was approximately 83.5:1. Also, all the method factors explained unsubstantial amounts of the total variances. Overall, the analysis results revealed that common method variance bias was probably not a serious problem in this study.

6. Discussion and Conclusion

This study proposed a theoretical model to investigate the critical factors that facilitate online gameplay of Pokémon Go and the mediating role of situational engagement and its antecedents that affect player value. Our empirical results provided valuable findings. Specifically, we empirically confirmed the following: (1) Context facilitation and intrinsic motivation play significant roles in influencing situational engagement, which in turn affects player value. This finding confirms the argument set forth by Allen et al. (2013) that motivation should be considered as a precursor to activity theory; it is also consistent with Hsia et al. (2020), which revealed that personalized incentives positively affected situational engagement in an omnichannel retailing context. (2) Situational engagement has a full mediating effect between context facilitation and player value as well as a partial mediating effect between intrinsic motivation and player value in Pokémon Go. Nardi (1996) and Allen et al. (2013) have argued that tools play a critical mediating role in between a subject and object of activity in facilitating outcome transformation. Our findings extend the results of these previous studies by offering insight into the under-researched context of the mediating role of the object of an activity on the relationships among the activity's outcome and motivation, subject, and tools. Game player value is enhanced by situational engagement. This transformation is dependent on the intrinsic motivation of players and the context facilitation provided by IT-enabled platforms.

6.1. Theoretical Implications

This paper presents three key theoretical contributions. Our first theoretical contribution is related to the precursors and consequences of situational engagement in Pokémon Go specifically and mobile gaming generally. Situational engagement is driven by the interaction of a motivated player with specific context facilitation that is embedded in game affordances and functionalities. Such enhanced interaction with the object of the activity allows players to create optimal value through situational engagement. Our findings confirmed that situational engagement is a crucial construct for understanding player behavior and plays a critical mediating role in influencing player value creation in the Pokémon Go context. Additionally, we confirmed that context facilitation and intrinsic motivation play significant roles in facilitating situational engagement; in turn, these three factors affect player value. Our findings extend the understanding of the nomological network of situational engagement in the gaming context, thereby contributing to the literature on activity theory.

Our paper's second theoretical contribution is related to the mediating role of an activity's object on the relationships among its subject, tools, and outcome. Activity theory proposes a strong notion of mediation: all human behavior is shaped by the tools and systems that we use. Our study identified the indirect and direct effects of two factors (i.e., context facilitation and intrinsic motivation) on player value through situational engagement. Our results revealed that situational engagement plays a partial mediating role that enhances the effects of context facilitation and intrinsic motivation on value. Moreover, our results revealed that subject and tools both influence outcome. We also identified the influences of an object of activity on outcomes. We established a positive causal relationship among these factors by integrating our research findings with those in the literature (e.g., Allen et al., 2013; Nardi, 1996). Intrinsic motivation and context facilitation in a synergistic IT-enabled platform provide integrative effects that facilitate situational engagement, which in turn influences player value in the Pokémon Go context. These findings offer greater insight into activity theory and provide an improved understanding of the importance of the object of an activity and its mediating effects on player value.

This paper's final theoretical contribution is our analysis of activity theory within the context of gaming applications (Chung et al., 2019; Hwang and Choi, 2020; Legaki et al., 2020). Modern mobile games and the environments that they inhabit, develop, and facilitate are based on an ever-increasing requirement for technology advancement. The cyber–physical gaming environment that players enjoy could not exist without the confluence of diverse technologies and applications. Without activity theory and an understanding of the importance of tool mediation in enabling outcome transformation, understanding the unique situational engagements provided by mobile settings would simply not be possible. On the basis of observations of real-world phenomena in the Pokémon Go context, the nature of embedded IT tools underpins all other relationships within the game; as such, it is impossible for the objects of an activity to influence its outcomes without embedded tools. Given the activity theory framework and its explanatory power, the need to situate tools as enabling agents clearly underpins all other relationships in the IS context. We therefore suggest that more IS context–based research in the activity theory field is needed, especially considering the rapidly evolving technological developments that the framework can capture.

6.2. Practical Implications

This study contributes to the emerging stream of research on online game player behavior. Our practical contribution is the confirmation of the importance of an IT-enabled platform in a cyber–physical gaming context. Our results suggested that motivated and empowered players of Pokémon Go can enjoy increased interactions with friends to accomplish their goals through touch-points provided by an IT-enabled platform. Game developers can effectively address players' motivations and take advantage of synergistic platforms to create context facilitation through situational engagement to increase player value. This suggests that game developers should prioritize the awareness of player needs and leverage feature-rich platforms to provide a wide range of mobile gaming content; these actions should thereby attract additional players to participate in such gaming environments.

From a practitioner perspective, our results imply that an IT-enabled gaming platform should be designed with clear in-game affordances and functionalities to enable players to participate and create enjoyable spaces that are easily understood and allow for interactions with other players (Aslam and Brown, 2020; Harteveld and Sutherland, 2017; Spallazzo and Mariani, 2018). For example, the platform should offer virtual elements with clues (e.g., sounds, vibrations, and on-screen markers) to guide players through game scenarios and allow them to understand how objects in the cyber–physical environment operate; this should increase their willingness and ability to participate in situated IT-enabled activities (Hall et al., 2020; Jang et al., 2018; Qin, 2021).

Game developers should also offer synchronous feedback and functionalities to guide players in various situations such as finding items, interacting with the environment, and easily encountering interesting and enjoyable challenges. Because such an environment provides a chain of player actions directed toward specific gaming scenarios, this environment becomes increasingly well positioned to facilitate player value creation. Online game developers might consider providing synergistic functionalities that are compatible with player activities to enhance players' capabilities and efficiency. In addition, developers should be aware that the relevant motivations, context facilitation, and situational engagement have strong effects on player value in mobile games. Thus, developers should consider online players' needs from the outset by exploiting their nostalgia and other intrinsic motivations and by enhancing their understanding of platform functionalities. They should then offer various interesting gaming contexts, events, and activities to facilitate player value creation.

For better understanding of player behavior, we further interviewed six experienced players, three content creators and three scholars familiar with online gaming and Pokémon Go. The interview results indicated that the range of situational engagement options was important to how long players participated in the game. The average amount time interacting with Pokémon Go was approx. 90mins a day. This level of engagement is made up of a wide range of activities, such as hatching, collecting, battling and leveling up. The underlying game mechanics have evolved to where the novel aspects Pokémon Go, such as AR and LBG fit alongside more traditional aspects of game play to

offer greater sources of engagement. Motivations such as leveling up and collecting rare game items are just as important at engaging players as interacting within a cyber-physical environment. These observations fit well with the Process Model of engagement and the distinct stages of player engagement. Users may initially be drawn to a game due to interest, word of mouth or having a particular goal in mind, leading to more sustained engagement with attributes such as interactivity, feedback and challenge. Whilst the overall cyber-physical environment in Pokémon Go is unique, many of the core game characteristics that continue to engage players can be found across a range of games types (Boyle et al., 2016; Ghazali et al., 2019; Hamari et al., 2019; Merikivi et al., 2017; Qin, 2021). What seems to separate Pokémon Go, from other mobile games in particular, is the vast range of gaming activities that are available to keep a diverse playing population engaged. Many respondents have mentioned that if the game had simply stayed as the initial AR/LBS type game then they would have stopped playing. It has been the addition of more complex and a broader range of engaging game elements that have continued to motivate them to keep on playing.

6.3. Limitations and Suggestions for Future Research

This study had certain limitations that represent opportunities for further research. First, this study was conducted in Taiwan and was based on self-reported data from individual respondents. Caution should be applied when attempting to generalize our findings, as data from such a convenient sampling approach and web-survey instruments do not represent entire populations. As such, our findings may not be applicable to all mobile gaming contexts. The survey responses that were used in this study were cross-sectional data. Further studies are required to expand the boundaries of the analysis to other populations, and scholars should also consider a longitudinal approach to validate and extend our proposed model. Additionally, we only employed the survey method in this study; it may not reveal all authentic online gaming situations. In future studies, field studies or field experiments could be implemented to examine the convergent validity of our findings. Our research only focused on Pokémon Go because of its representativeness and multiple motivations for player engagement. However, other online games may exhibit different contextual, motivational, and situational factors that may also influence player engagement and value creation. Finally, qualitative analytical approaches with in-depth personal interviews, projective techniques, or metaphor analysis could be applied in future studies to collect data on the psychological motivations of online game players. Such an approach could uncover the subconscious motivating factors of players, and a comparison between quantitative and qualitative research methods could enhance our understanding of the psychological factors underlying online game player value.

6.4. Conclusion

The online gaming market has grown exponentially in recent years, but previous studies have only rarely provided complete explorations of the drivers of player value and the mediating role of situational engagement in facilitating player value in cyber–physical gaming contexts. Our study determined that intrinsic motivation and context facilitation are the most critical factors in collectively triggering players' situational engagement and thereby creating player value in the cyber–physical environment. This study's empirical results thus increased our understanding of the causal effects of situational engagement on player value. In addition, this study addressed an emerging gap in the IS literature by exploring the previously unexamined mediating role of the object of an activity on the relationships between the activity's subject, tools, and outcome. Drawing on the theoretical perspective of Allen et al. (2013), the results confirmed that motivation is a critical precursor of activity theory.

Acknowledgments

This research was supported by the Ministry of Science and Technology, Taiwan, under operating grants MOST 110-2420-H-110-002-MY3 and 110-2410-H-143-006 and was partially supported by the Aim for the Top University Plan of National Sun Yat-Sen University and Ministry of Education, Taiwan.

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Appendix A: Item Loadings and Cross-Loadings.

Construct	Item#	Context Facilitation (CF)	Intrinsic Motivation (IM)	Situational Engagement (SE)	Hedonic Value (HV)	Achievement Value (AV)	Nostalgia Value (NV)
Context Facilitation (CF)	CF01	**0.869**	0.381	0.382	0.394	0.327	0.124
	CF02	**0.908**	0.388	0.392	0.397	0.308	0.137
	CF03	**0.826**	0.376	0.347	0.391	0.319	0.164
Intrinsic Motivation (IM)	IM01	0.440	**0.755**	0.515	0.563	0.389	0.187
	IM02	0.288	**0.751**	0.452	0.458	0.357	0.227
	IM03	0.306	**0.762**	0.394	0.448	0.302	0.227
	IM04	0.272	**0.752**	0.426	0.428	0.306	0.337
Situational Engagement (SE)	SE01	0.398	0.542	**0.891**	0.534	0.401	0.231
	SE02	0.393	0.470	**0.872**	0.462	0.338	0.205
	SE03	0.288	0.484	**0.742**	0.409	0.402	0.255
Hedonic Value (HV)	HV01	0.427	0.487	0.476	**0.816**	0.359	0.230
	HV02	0.408	0.561	0.497	**0.872**	0.375	0.223
	HV03	0.306	0.545	0.440	**0.824**	0.314	0.306
Achievement Value (AV)	AV01	0.285	0.381	0.361	0.348	**0.890**	0.228
	AV02	0.328	0.402	0.385	0.358	**0.907**	0.191
	AV03	0.347	0.407	0.451	0.389	**0.830**	0.224
Nostalgia Value (NV)	NV01	0.166	0.238	0.264	0.260	0.213	**0.855**
	NV02	0.179	0.246	0.216	0.235	0.254	**0.886**
	NV03	0.152	0.366	0.269	0.342	0.195	**0.865**
	NV04	0.039	0.229	0.178	0.181	0.164	**0.786**

* All items loaded significantly ($p < 0.01$) on their respective constructs.

Appendix B: Common Method Bias Analysis

Construct	Item#	Substantive Factor Loading (R1)	$R1^2$	Method Factor Loading (R2)	$R2^2$
Context Facilitation (CF)	CF01	0.863**	0.745	-0.057	0.003
	CF02	0.924**	0.853	-0.044	0.002
	CF03	0.815**	0.664	0.110	0.012
Intrinsic Motivation (IM)	IM01	0.495**	0.245	0.002**	0.000
	IM02	0.756**	0.571	-0.025	0.001
	IM03	0.933**	0.871	0.025**	0.001
	IM04	0.829**	0.688	0.025	0.001
Situational Engagement (SE)	SE01	0.880**	0.774	-0.006	0.000
	SE02	0.978**	0.956	-0.019**	0.000
	SE03	0.632**	0.399	0.273	0.074
Hedonic Value (HV)	HV01	0.796**	0.634	-0.013	0.000
	HV02	0.880**	0.775	-0.174	0.030
	HV03	0.835**	0.697	-0.073	0.005
Achievement Value (AV)	AV01	0.932**	0.868	0.008	0.000
	AV02	0.942**	0.887	-0.008	0.000
	AV03	0.746**	0.557	0.073**	0.005
Nostalgia Value (NV)	NV01	0.850**	0.722	-0.081	0.007
	NV02	0.888**	0.788	0.021	0.000
	NV03	0.824**	0.679	-0.117*	0.014
	NV04	0.836**	0.698	0.113	0.013
Average		0.832	0.703	0.002	0.008

*p<0.05; **p<0.01